DOCUMENT RESUME

ED 345 293 CS 213 369

AUTHOR Lauritzen, Carol
TITLE When Children Write Math Stories.
PUB DATE Nov 91
NOTE 11p.; Paper presented at the West Regional Conference of the International Reading Association (Portland, OR, February 27-29, 1992).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Childrens Literature; Content Area Writing; Elementary Education; Elementary School Mathematics; Grade 2; Grade 6; Instructional Effectiveness; *Mathematics Instruction; *Story Telling; *Writing Assignments; Writing Research
IDENTIFIERS *Mathematical Stories; Writing Contexts

ABSTRACT

From January to May, 1991, an educator/researcher met once a week with two classes of students, one at second grade and the other at sixth, to share mathematical stories. Prior to these sessions all the students in these two classes and also all the other second- and sixth-grade students in the same school were asked to write a "math story" based on prompts provided by the educator/researcher. Children wrote a second math story in May. Analyses of these stories indicated that: (1) in January, few second graders and most sixth graders successfully combined math with a narrative structure; (2) students learned to write math stories by participating in reading and listening to math-related stories; (3) the majority of sixth-graders' stories fell into two groups: those that simply used numbers that were generally unrelated to the story, or those that contained "translation" problems--i.e., stories in which something was counted, measured, or sorted, or which involved the use of money or some basic arithmetic; and (4) sixth graders exposed to the weekly sessions wrote a greater variety of stories and wrote more stories that emphasized plot, used mathematics to resolve a conflict, or actually explained a mathematical concept than the rest of the sixth graders. Students provided with well-written works of children's literature have a model besides their textbook for mathematical writing--one that allows them to explore mathematical concepts through narratives. (Two tables of data and four figures presenting five examples of children's stories are included.) (RS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Carol Lauritzen
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED345293

When Children Write Math Stories

by
Carol Lauritzen

Eastern Oregon State College
La Grande, Oregon
November, 1991

CS213369

BEST COPY AVAILABLE

When Children Write Math Stories

Reports about the use of writing to learn mathematics are numerous (Burton 1985; Davison & Pearce 1988; Fennell & Ammon 1985; Hosmer 1986; Schubert 1987; Vukovich 1985; Wilde 199). These articles confirm the benefits of having students write to reflect, clarify, record or demonstrate their learning in mathematics. A wide range of writing types were noted including summaries, definitions, explanations, instructions, notes, predictions, lists and labels. Nearly all of the reports describe the utilization of writing for mathematics in the transactional mode; that is, writing that describes, records, informs, or persuades. However, for children, the value of stories for engaging and enriching learning should not be overlooked. Wells (1986, p. 194) states, "Constructing stories in the mind--or storying, as it has been called--is one of the most fundamental means of making meaning, as such it is an activity that pervades all aspects of learning." Egan (1979, p. 120) also recommends that use of stories in any curriculum area: "Stories are the most effective tools for making their content meaningful." Based on a commitment to the power of stories in all curriculum areas (Lauritzen, in press), I decided to accept the invitation offered by Borasi, Sheedy, and Siegel (1990) to become intrigued by mathematical stories.

From January to May, 1991, I met once a week with two classes of students, one at second grade and the other at sixth, to share mathematical stories. Prior to these sessions all the students in these two classes and also all the other second and sixth graders in the same school were asked to write a "math story." The

classroom teachers conducted this writing assignment based on a prompt I had provided. In May, the same students wrote a second math story. I had a curiosity, but no preconceived notions, about the type of writing children would do in response to a request to write a "math story". In this article I would like to share my discoveries regarding what the children wrote.

I looked at the children's writing in two ways. First, I wanted to determine how many students wrote a true story. That is, was their writing based on a narrative structure with characters who experienced conflict that was resolved in some way? The results of this analysis are in Table 1. The percentages show that sixth graders are much more likely to meet the dual requirement of combining math with a story. In January, few second graders could accomplish this task. While all of them included a math component, they were much more likely to incorporate it into a piece of writing that was either expressive or transactional. Figure 1 shows second grade examples of expressive and transactional writing. Although second graders as a group increased in their ability to combine math and story, those students who read and listened to children's literature for four months did create a larger percentage of stories in May than the other second grade students who had not experienced math-related literature. Figure 2 is a math story written by a second grader in May. In contrast to the second graders, most sixth graders were initially able to utilize a narrative structure. In addition, sixth graders seemed able to benefit from experience with math story models since all the students in the participating group wrote stories in May. The

changes in both second and sixth grade indicate that children can learn to write math stories by participating in reading and listening to math-related stories.

In order to determine if there was any qualitative differences in the stories, their writing was examined a second time. Since so few second graders had written narratives, only the sixth grade stories were included in this second analysis. I wanted to discover how students had used math within the stories. I found that the stories could be categorized by how integral the mathematics was to the story. Some students simply used numbers in their stories. For example, one student wrote "One day a dude name Joe was driving down a dirt road out of Lakeview, Oregon when he saw a small opening in the side of a large cliff. The opening was about 3 feet wide and 5 feet long--just enough for him to get through so he went in. The room they were in was about 10 feet wide and 7 or 8 feet high and was shaped like a circle." The use of numbers in this category of story had little connection with the central idea of the story. A second group of stories were those that contained translation problems. In these stories such as the one in Figure 3, something was counted, measured, or sorted; money was used; or a basic arithmetic operation was needed. These were similar to the word problems found in math textbooks. And, interestingly, nearly all the stories in this category were on the topic of money. A third category were stories that emphasized plot and characters and had characters who used math in some way. These stories were different from a fourth type in which the solution of a mathematical problem was central to resolving the conflict of the

story. The final category was comprised of stories in which the story itself was used to explain a mathematical concept. I view these categories as a type of hierarchy with each successive category incorporating a more integral use of mathematics in the story. Table 2 gives the percentages of student stories in each of these categories. The majority of the students' stories are in the lowest two categories. What is noteworthy is that the students exposed to weekly sessions of story reading wrote a greater variety of stories and write more stories in the upper part of the hierarchy including some concept stories. Figure 4 is a concept story written by a sixth grader in May. Stories of this type could be used to help other students understand mathematical concepts.

While my major purpose of conducting math story sessions with the second and sixth grade students was to facilitate their learning of math concepts through stories, the improvements in writing math stories was a fascinating side effect. Students tend to write following the models they have experienced. Students whose only model for mathematical writing is their textbooks tend to write word problems similar to those in the textbooks. Students provided with well-written works of children's literature have a different model--one that allows them to explore math concepts through narratives. My experience leads me to believe that all children benefit from the use of story in their learning of mathematics. I invite you to become intrigued with the power of reading and writing mathematical stories.

Table 1: Percentages of types of writing

	Group 2-A		Group 2-B		Group 6-A		Group 6-B	
	Jan.	May	Jan.	May	Jan.	May	Jan.	May
Expressive	9%	0%	18%	16%	0%	0%	4%	0%
Transactional	91%	67%	76%	71%	11%	0%	15%	32%
Narrative	0%	33%	6%	13%	89%	100%	81%	68%

*Groups 2-A and 6-A participated in math story sessions.

Table 2: Level of Mathematics/Story Integration

	Group 6-A*		Group 6-B	
	January	May	January	May
Numbers only	37%	8%	22%	23%
Translation problem	5%	26%	55%	59%
Character uses math	16%	19%	0%	9%
Math involved in solving story confict	21%	19%	11%	4.5%
Concept story	0%	8%	0%	0%
Other	21%	20%	12%	4.5%

*Group 6-A participated in math story sessions. Group 6-B did not.

Figure 1: Second grade expressive and transactional writing

Expressive

When I had math I had 1.00 I took 25¢ away I do not no whit I had I'm going to guess I guess it is 75¢ I am happy I got it rit I can git it rit by my suf I do Know. I am smt

Transactional

On my way to Nabraska my dad and I did the gas myaleh. I used times and daiding and It told how far you went with one galon of gas. Once we got up to 30 miles.

Figure 2: Second grade story

The Wicked Witch Yamaiba

One day, a boy was coming home from the market on his bullock cart when the witch came running after him. He tried to get away but the witch caught up with him. The witch said give me 12 soshijes. or I will eat you up hair and all! So the boy gave her 12 soshijes give me 12 more soshijes or I'll eat you hair and all! But that will be 24 soshijes I don't care! Give me 12 more soshijes now! The boy trid to trik the witch and he did he all was made a stel soshij and gave the witch the stel. soshij. the witch bit into the soshij and all her teeth fell out and she skreemed loud!

Figure 3: A sixth grade story with a translation problem using money

One day after hours of laying around watching game shows and MTV all day, I decided to go to the show, so I called by best friend Kendra. She said that she could go and away we went. After standing in line with a $5.00 bill in my hand I walked up to the window and got a ticket for $2.00. (They raised the price from $1.50.) I handed the lady named Catherine my $5.00 and got $3.00 back. At intermission I was hungry for a Snickers so naturally I bought one. That cost $.50 and a bucket of popcorn sounded good so I bought that too. The popcorn was $.75. Out of my $3.00 I had $1.75 left over. What could I do with that? Oh, well, what do we have here? A bag of gummy bears for $.50! "And some gummy bears" I told the lady. $1.25 was all I had left. I could save it I decided but then it hit me! NERDS! I didn't buy any so naturally (again) I had to buy some for $.50. I'm down to $.75. Bankruptcy was gaining fast. Then Kendra showed up having found Erika, Shandi, Marie, Celeste and Brooke! They all needed a quarter to get the food they wanted. So the sweet person that I am gave them each a quarter. But there was a slight problem. I didn't have enough quarters. So I . . . I . . . where was I . . . oh ya . . .. I gave back my Nerds to get my $.50 back, gave them each a quarter and went to sit down. But Rachel was sitting in my seat. I said, "Hey" and then she asked "Can I borrow a quarter?" OH NO!

Figure 4: A concept story written by a sixth grader

A long time ago there were two llama herders. They owned about 300 llamas. They also owned 1 large field. These people wanted to put some fences to divide up the large field. They put in 2 fences with 100 llamas in there a piece. That was settled, but they lived up in the Andes and it was very cold. The llamas grew thick winter coats and then shed them. Why let all those furs go to waste? They could shear them and sell the fur. There was only one problem. Too many llamas. By the time they got to all the llamas they would've shed their fur by then. If they only did the first hundred, those sheared llamas would be freezing cold. What could they do? Then their ranch hand got an idea. Just shear one-third of the llamas wool of every one. They did that in enough time, but the llamas looked weird with just their back end sheared off. People around thought they were nutty. The llamas back ends started turning blue. So from then on they sheared one-third of each llamas in stripes. How could they do that? They made 4 even stripes that about equaled one-third. They painted the llamas stripes black and people thought they were zebras. The black paint absorbed good sun so the llamas wouldn't be cold. How would they pay for the paint? They used half of the money from selling wool. Everything worked out perfectly until the llamas had babies. 400 llamas. More fencing was needed. The end.

References

Borasi, Raffaella, John R. Sheedy, and Marjorie Siegel. "The Power of Stories in Learning Mathematics." *Language Arts* 67 (February 1990): 174-189.

Burton, Grace. "Writing As a Way of Knowing in a Mathematics Education Class." *Arithmetic Teacher* 33 (December 1985): 40-45.

Davison, David M., and Daniel L.Pearce. "Using Writing Activities to Reinforce Mathematics Instruction." *Arithmetic Teacher* 35 (April 1988): 42-45.

Egan, Kieran. *Educational Development*. New York: Oxford University Press, 1979.

Fennell, Francis (Skip), and Richard Ammon. "Writing Techniques for Problem-Solvers." *Arithmetic Teacher* 33 (September 1985): 24-25.

Lauritzen, Carol. "Stories in the Curriculum." *Oregon English* (in press).

Hosmer, Patricia C. "Students Can Write Their Own Problems." *Arithmetic Teacher* 34 (December 1986): 10-11.

Schubert, B. "Mathematics Journals: Fourth Grade." In T. Fulwiler (Ed.), *The Journal Book*. Portsmouth, NH: Boynton/Cook 1987, 348

Vukovich, D. "Ideas in Practice: Integrating Math and Writing Through the Math Journal." *Journal of Developmental Education* 9 (1985): 19-20.

Wells, Gordon. *The Meaning Makers*. Portsmouth, NH: Heinemann Educational Books, 1986.

Wilde, Sandra. "Learning to Write About Mathematics." *Arithmetic Teacher* 38 (February 1991): 38-43.